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SEA CUCUMBER AND SEA URCHIN RESOURCES AND *BECHE-DE-MER* INDUSTRY

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Introduction

The Andaman and Nicobar Islands offer one of the most suitable habitats for sea cucumbers and sea urchins due to the presence of sheltered bays and lagoons. The sea cucumbers prefer muddy or sandy flats and the sea urchins rocky coasts and algal beds. There have been very few reports on these echinoderms of the islands in the earlier years (Theel, 1882 ; Koehler and Vaney, 1908 ; Koehler, 1927). More recently James (1969) recorded several species of sea cucumbers and sea urchins from the islands. A specific account of the *beche-de-mer* resources of India was given by James (1973). A cottage level export-oriented *beche-de-mer* industry has been established in the Andamans since 1975. Kloss (1902) had made passing references to this resource.

Sea Cucumber Resources

A list of echinoderms known from the Andaman and Nicobar Islands i given in the Annexure. Although there are more than 40 species of sea cucumbers in the shallow waters of Andaman and Nicobar Islands (James, 1969) only a few species are useful for *beche-de-mer*. Domantay (1961) has stated that, in the Philippines the following species are used in the fresh condition : *Holothuria pardalis, H. hilla, H. impatiens, H. scabra, H. edulis, Actinopyga miliaris* and *A. serratidens*. All the above species of sea cucumbers are available in plenty in Andaman and Nicobar Islands.

Holothuria atra is by far the most abundant sea cucumber around the islands. Though not of high quality, due to their numerical abundance this species can be used for *beche-de-mer*. It occurs usually on dead coral reef flats with sandy or muddy patches. It prefers areas where calcareous alga *Halimeda* sp. on which it feeds is present. In some areas, especially in Sesostris Bay, 10-15 specimens are found in 25 sq.m area. On the reef flat the size range is 200-300 mm and on the outer edge of the reef the specimens reach 500 mm in length. This species was processed for the first time in Andamans in 1976. It is to be noted that *H. atra* has a toxin in the body wall in the living condition. Probably boiling and processing renders the product harmless.

Holothuria scabra (Pl. I, A) is almost exclusively used in Andamans and on the mainland (Gulf of Mannar and Palk Bay) due to its abundance, large size and thick body wall. It is somewhat gregareous on muddy flats and is confined to shallow areas preferring low saline and brackish waters. It occurs in good numbers in North Andaman, especially around Mayabunder and Diglipur. Large numbers (10 per 25 sq.m) of juveniles 60-160 mm in length were noted during December to February in Sesostris Bay. Krishnaswamy and Krishnan (1967) observed that this species has two spawning peaks in July and October along the south-east coast of India.

Actinopyga mauritiana, A. echinites, A. miliaris and *A. serratidens* are found in Andaman and Nicobar Islands. The first three species are of value for culture. *A. mauritiana* is the most important species under this genus. This species was regularly collected by the Taiwanese who were stationed at Port Blair during 1975-76. It is smaller than the other two species and is usually found along rocky coasts and among rock pools. The largest of them reaches 400 mm in length. *A. echinites* (Pl. I, B) which occurs along with *A. mauritiana* reaches a larger size of 500 mm and is uniformly chocolate brown in colour. Often pieces of small corals are found attached to the animal. *A. miliaris* (Pl. I, C) which is said to yield high quality *beche-de-mer* is found at Wandoor (South Andaman) along the

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rocky coast at a density of 10-15 specimens per 25 sq.m. It grows up to 500 mm in length.

Under the genus *Bohadschia* only *B. vitiensis* (Pl. I, D) occurs in appreciable numbers on the reef flats. It is a burrowing form which comes out at low tide when the water recedes. A thin coating of mud sticks to the body wall. In the Blair Reef the density is 10-15 animals per 25 sq.m. It reaches 500 mm in length. The main difficulty in processing this species is the presence of abundant Cuvierian tubules.

Labidodemas rugosum (Pl. I, E) is a little known species from Andaman Islands. It grows to a length of 210 mm and is found on coral flats buried deep in sand. Full specimens can easily be pulled out of sand. specimens (5-10 per 25 sq.m) have been collected from South Point at Port Blair.

In Hut Bay (Little Andaman) *Holothuria leucospilota* was found in great numbers (25-125 per 25 sq.m). This species is not used at present in Andamans, but Panning (1944) mentions it to be a commercially important species.

Field Key to the Identification of Sea Cucumbers

1. Anus not guarded by five calcified 'teeth' or five groups of hardened papillae 2

1'. Anus either guarded by calcified 'teeth' or five groups of hardened papillae 4

2. Body translucent, calcareous ring ribbon-like with radials and interradials dissimilar in size..... *Labidodemas rugosum* (Ludwig)

2'. Body not translucent, calcareous ring stout with radials and interradials more or less of the same size.....3

3. Colour uniformly black, body tubular, body wall not thick but leathery.....*Holothuria atra* Jaeger

3'. Body although cylindrical, slightly flattened on the ventral side ; dorsal side pale grey or black crossed by irregular light bands or bars of white, pale yellow or grey ; ventral side snowy white dotted with many minute black specks ; body wall thick and slightly slimy ..... *Holothuria scabra* Jaeger

4. Anus guarded by five groups of hardened papillae ; Cuvierian tubules white and copious and released at the slightest disturbance ..... *Bohadschia vitiensis* (Semper)

4'. Anus guarded by five calcified 'teeth'; Cuvierian tubules sparce and pink in colour 5

5. Colour brown on the dorsal side and white on the ventral side ..... *Actinopyga mauritiana* (Quoy & Gaimard)

5'. Uniform colour throughout 6

6. Colour uniformly black ; body wall very thick and hard ..... *Actinopyga miliaris* (Quoy & Gaimard)

6'. Colour uniformly chocolate brown ; sand often settles on the dorsal side of the body ..... *Actinopyga echinites* (Jaeger)

Sea Urchin Resources

Another group of echinoderms which is commercially important and edible is sea urchins. The gonads of sea urchins are said to be a delicacy and are eaten fresh adding a little vinegar or lime.

Tripneustes gratilla (Pl. I, F) is found on the algal beds of Sesostris Bay. In each shore seine haul three or four large sea urchins come up. The horizontal diameter of the tests varies from 100 to 120 mm. The gonads are massive in the ripe condition. In Aberdeen jetty area at Port Blair large number of *Diadema setosum* are found attached to the wall of the jetty. It is also found in good numbers in Nancowry Harbour. The diameter of the tests ranges 50-80 mm.

Echinometra mathaei is well distributed on the rocky coasts around Port Blair. It is light green in colour and lives under stones or crevices. *Echinometra mathaei* var. *oblonga* (Pl. II, A) is more common and in some places as many as 10 animals are found per sq.m. It is dark brown in colour and lives in burrows made by it.

Field Key for the Identification of Sea Urchins

1. Spines long, sharp and brittle ; colour black ..... *Diadema setosum* Leske

1'. Spines short, not brittle, colour white, light green or dark brown 2

2. Size large, spines very small and white in colour ..... *Tripneustes gratilla* (Linnaeus)

2'. Size medium, spines moderate ; colour either light green or dark brown 3

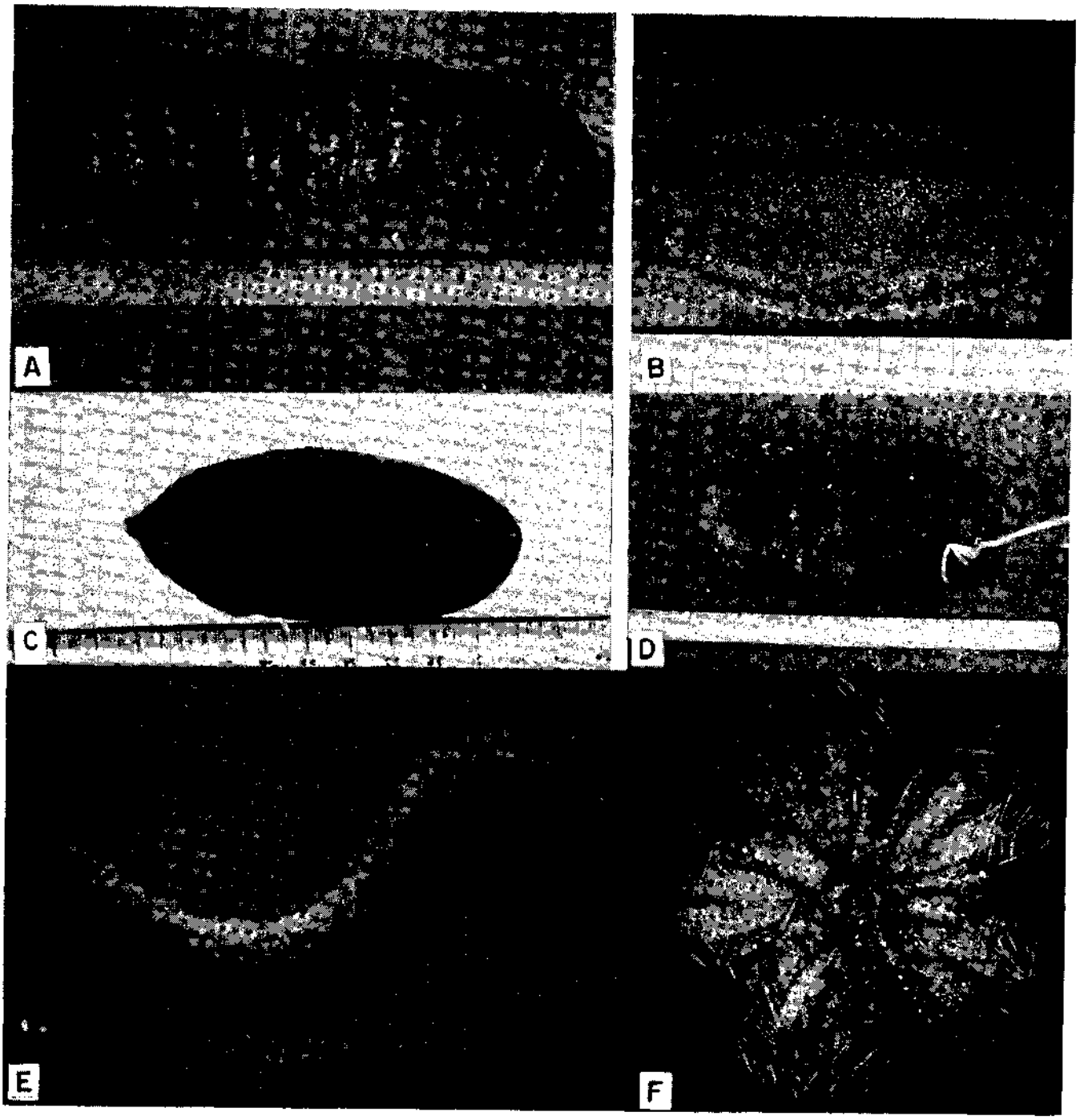

PLATE I. A. *Holothuria scabra* ; B. *Actinopyga echinites* ; C. *A. miliaris* ; D. *Bohadschia vitiensis* with Cuvierian tubules coming out ; E. *Labidodemas rugosum* ; F. *Tripneustes gratilla*.

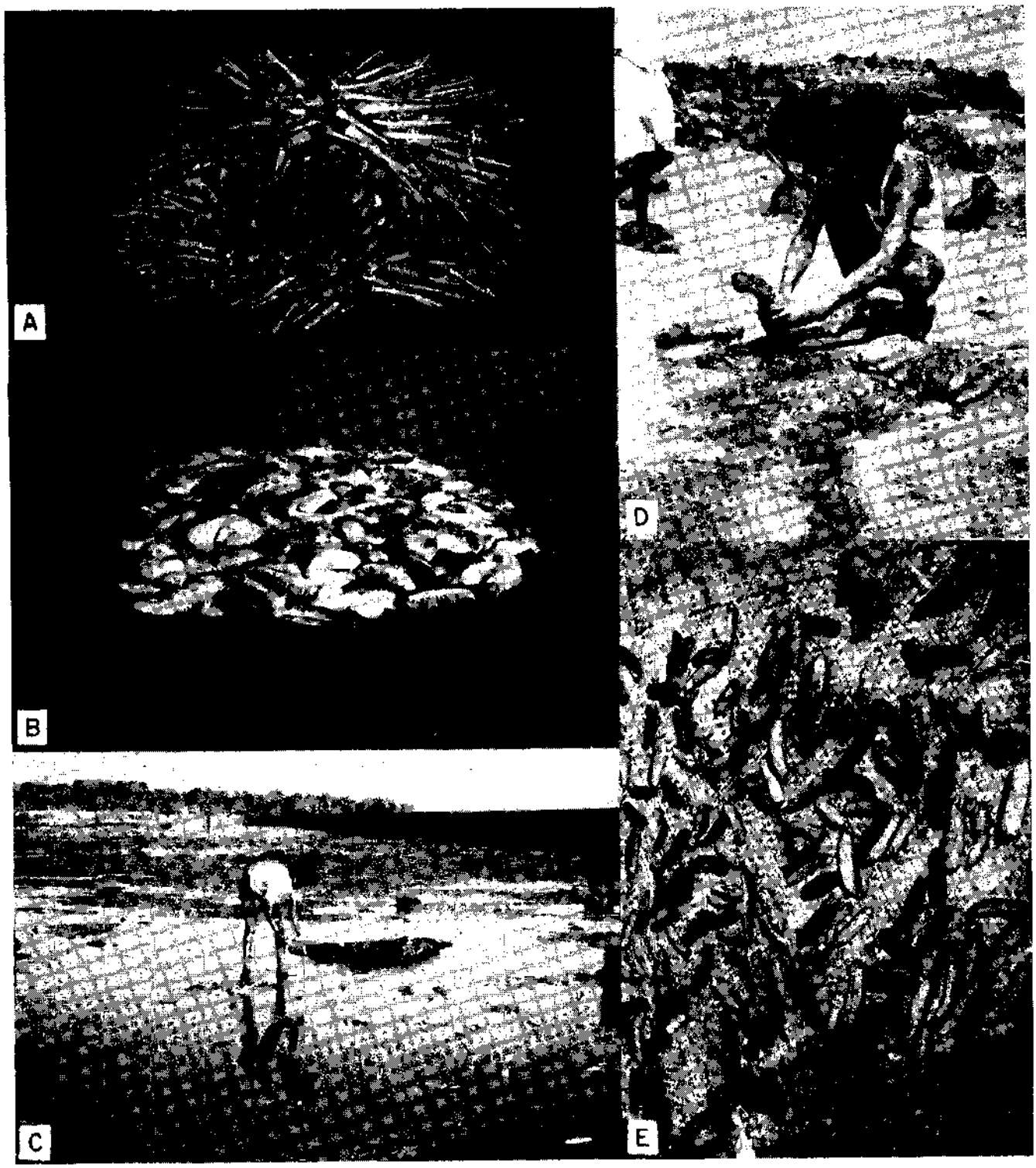

Plate II. A. *Echinometra mathaei* var. *oblonga* ; B. Juvenile sea cucumbers collected from Sesostris Bay, Port Blair, for farming ; C. The juveniles being broadcast in the enclosed area near Aberdeen jetty ; D. An aspect of *beche-de-mer* processing ; D. *Beche-de-mer* being dried on mat.

3. Occurs under stones or inside crevices ; spines light green and arranged in a regular manner .....
Echinometra mathaei (de Blainville)

3'. Occurs only in tunnel-shaped burrows ; spines dark brown and arranged in groups.....
E. mathaei var. *oblonga*

Farming Potential

Attempts were made to collect juveniles of sea cucumber *Holothuria scabra* and farm them in a sheltered area at Port Blair. In February 1978, a total of 462 juveniles in the length range 65-160 mm (modal class 81-90 mm) was collected from Sesostris Bay and broadcast in an enclosed area (1.5ha) near Aberdeen jetty (Pl. II, B, C). The bottom was muddy and partly sandy. At the end of July 1978, they had grown to 190-290 mm (Anon., 1978). The incomplete experiment gave some indication of the possibilities of semi-culture of sea cucumbers.

The mudflats at Diglipur, Mayabunder, Junglighat near Port Blair and Campbell Bay are favourable areas for culture of sea cucumbers. Of the eight species described, *Holothuria scabra* is ideally suited for culture as it is gregareous in occurrence and juveniles are available in large numbers during certain seasons. Farming can be combined with factory level processing of *beche-de-mer* for export. At Mannar in Sri Lanka a factory was set up at a cost of Rs. 113,000 in 1974 and the venture was profitable at processing 1.2 tonnes a month (Paramanathan, 1974). Among sea urchins *Tripneustes gratilla* appears suitable for farming. It grows to a large size on algal beds in shallow waters. Juveniles can be collected from areas of abundance and stocked on enclosed algal beds for further growth.

Beche-de-mer Industry

Processing

Sea cucumbers (*Holothuria scabra*) are collected by hand picking during low tide and by diving in shallow waters with a mask. After collection they are heaped and crowded at one place which makes them to eviscerate. Those which fail are slit at one end and the internal organs flow out (Pl. II, D). The eviscerated animals are put in iron drums and boiled in sea water for 1-2 h depending on the size of the sea cucumbers used. While boiling the material is constantly stirred to make the product uniformly cylindrical. After a distinct cooked odour is emitted, they are removed and buried in a pit near the shore which is kept moist. After 12 h they are taken in a basket and cleaned to remove all chalky deposits. After thorough cleaning, it is once again boiled in clean sea water for a few minutes. Then the material is removed and sun dried for 3-4 days (Pl. II, E). The material can also be smoke dried. For species other than *Holothuria scabra* minor modifications in processing are made.

Prospects and constraints

The prospects for *beche-de-mer* industry in Andaman and Nicobar Islands are bright due to rich sea cucumber resource. Some of the sea cucumbers of the islands are of high quality and the product fetches 10-15 times higher value compared to the mainland species. There are vast unexploited areas for sea cucumbers. Processing is simple and fuel materials are cheap and plenty. Labour is easily available.

The major problem of this industry is its seasonality. Rains prevent processing for about eight months in a year. This can be solved by using artificial driers. Another serious problem is the lack of transport facilities. Though there are more than 300 islands, processing can be done only in a few places which have quick access to Port Blair from where it has to be shipped to the mainland for export. Processing should be done under more hygienic conditions. The humidity is very high in Andaman and Nicobar Islands and the product should be packed in polythene bags to avoid moisture absorption.

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ANNEXURE

List of Echinoderms Known from Andaman and Nicobar Islands

Class : CRINOIDEA

Order : ARTICULATA

Sub-order : ISOCRINIDA

Family : BOURGUETICRINIDAE

Bathycrinus wood-masoni A. H. Clark (West coast of Nicobar)

Family : PENTACRINIDAE

Comastrocrinus ornatus (A.H. Clark) (Andaman Sea)

Sub-order : COMATULIDA

Group : OLIGOPHREATE

Superfamily : COMASTERIDA

Family : COMASTERIDAE

Sub-family : CAPILLASTERINAE

Comatella maculata (P.H. Carpenter) (Nicobar Islands)

Capillaster mariae A. H. Clark (Andaman Island, depth 107 m)

Sub-family : COMASTERINAE

Comaster gracilis (Hartlaub) (Port Blair, depth 54 m)

C. multibrachiata (P.H. Carpenter) (Andaman Island, depth 31-54 m)

C. parvus A. H. Clark (Andaman Island, depth 96 m)

Sub-family : COMACTININAE

Comatula brevicirra (Bell) (Nicobar, depth 43 m)

C. micraster A.H. Clark (West of South Andaman Island, depth 100 m)

Superfamily : MARIAMETRIDA

Family : MARIAMETRIDAE

Dichometra protectus (J. Muller) (Andaman Island, depth 65 m)

Selenometra aranea (A.H. Clark) (Andamans, depth 52 m)

Stephanometra monocantha (Lutken) (Andaman Island, depth 52 m)

Family : COLOMBOMETRIDAE

Oligometra intermedia A.H. Clark (Andaman Seas)

Family : EUDIOCRINIDAE

Eudiocrinus minor A.H. Clark (Andaman Island)

E. ornatus A.H. Clark (Andaman Island, depth 76 m)

Family : HIMEROMETRIDAE

Amphimetra philiberti (J. Muller) (Port Blair)

Craspidometra acuticirra (P.H. Carpenter) (Andaman Island)

Heterometra bengalensis A.H. Clark (Andaman Island, depth 59 m)

Superfamily : TROPIOMETRIDA

Family : CALOMETRIDAE

Neometra spinossima A.H. Clark (Andaman Island)

Family : CHARITOMETRIDAE

Glyptometra invenusta (A.H. Clark) (Andaman Island, depth 1041 m)

Permissometra occidentalis A.H. Clark (South of Nicobar, depth 1024 m)

Family : THALLASOMETRIDAE

Crotometra eridanella A.H. Clark (Great Nicobar, depth 2049 m)

Thalassometra peripolos A.H. Clark (South of Nicobar depth 1024 m)

Group : MACROPHREATE

Family : ANTEDONIDAE

Eumetra indica A.H. Clark (Andaman Island, depth 777 m)

Iridometra nana (Hartlaub) (Andaman Island, depth 76 m)

Psathyrometra mira A.H. Clark (Andaman Island depth 741 m)

P. inusitata A.H. Clark (South of Ross Island, depth 484 m)

Sarametra nicobarica A.H. Clark (Off Nicobar Island)

Class : ASTEROIDEA

Order : PHANEROZONIA

Sub-order : PAXILLOSA

Family : ASTROPECTINIDAE

Astropecten monacanthus Sladen (Andaman Island)

A. griegi Koehler (Andaman Island, depth 237-744 m)

A. polyacanthus Müller and Troschel (Andaman Island 0-91 m)

A. tamilicus Döderlein (Andaman Island, depth 45 m)

A. zebra Sladen (Andaman Island)

Dipcaster pentagonalis Alcock (Andaman Island, depth 21 m)

D. sladeni Alcock (Andaman Island, depth 457 m)

Craspidaster hesperus (Müller and Troschell) Port Blair, depth 20 m)

Family : LUIDIIDAE

Luidia limbata (Sladen) (Andaman Island, depth 12-51 m

L. maculata Müller and Troschell (Andaman Island)

L. savignyi (Audouin) (Andaman Island)

Sub-order : VALVATA

Family : ARCHASTERIDAE

Archaster typicus Müller and Troschel (Andaman Island, littoral)

Family : GONIASTERIDAE

Anthenoides sarissa Alcock (Andaman Island, depth 237-457 m)

Asteroceramis fisheri Koehler (Andaman Sea, depth 409-519 m)

Calliaster mammillifer Alcock (Andaman Island, depth 448-493 m)

Dorigona belli Koehler (Andaman Island, depth 457 m)

D. nora Alcock (Andaman Island, depth, 1896 m)

Iconaster pentaphyllus Alcock (Andaman Island, depth 495 m)

Mediaster florifer Alcock (Andaman Island, depth 522 m)

Milteliphaster sp. (Andaman Island)

Nymphaster sp. (Off the coast of Andaman Island)

Pentagonaster arcuatus Sladen (Andaman Island, depth 495 m)

Anthenea rudis Koehler (Middle Andaman, intertidal)

A. pentagonula (Lamarck) (Andaman Island, intertidal)

Family : OREASTERIDAE

Culcita novaeguinea Muller and Troschel (Andaman Island 0-15 m)

C. schmideliana Retzius (Andaman Island, 0-15 m)

Protoreaster lincki (Blainville) (Nicobar Island)

Family : METRODIRIDAE

Metrodira subulata Gray (Andaman Island)

Family : OPHIDIASTERIDAE

Leiaster callipeplus Fisher (Andaman Island, depth 206 m)

Fromia indica Perrier (Port Blair, depth 10 m)

F. armata Koehler (Port Blair)

Linckia laevigata (Linnaeus) (Port Blair, intertidal)

L. guildingii Gray (Port Blair, intertidal)

Chaetaster vestitus Koehler (Andaman Island)

Ferdina offreti Koehler (Little Andaman, depth 18-62 m)

Nardoa aegyptica (Gray) (Andaman Island, depth 36 m)

N. carinata Koehler (Andaman Island, depth 18-96 m)

N. frianti Koehler (Andaman Island, depth 36 m)

N. lemonnieri Koehler (Andaman Island, Nicobar)

Ophidiaster armatus Koehler (Andaman Island, depth 31 m)

Tamaria dubiosa Koehler (Andaman Island)

T. fusca Gray (Andaman Island)

T. tubifer Sladen (Andaman Island, depth 96 m)

Sub-order : CRIBELLOSA

Family : PORCELLANASTERIDAE

Sidonaster batheri Koehler (Andaman Sea, depth 1224-2516 m)

Order : SPINULOSA

Family : ACANTHASTERIDAE

Acanthaster planci (Linnaeus) (Port Blair, Nicobar Intertidal)

Family : ASTERINIDAE

Asterina burtoni Gray (Port Blair, Intertidal)

A. sarasini (Koehler) (Port Blair, intertidal)

A. exigua (Lamarck) (Port Blair, intertidal)

Disasterina spinosa Koehler (Port Blair)

Nepenthina brachiata Koehler (Andaman Island)

Palmipes pellucidus Alcock (Andaman Island, depth 204 m)

Tegulaster ceylonica (Döderlein) (Port Blair, intertidal)

Family : ECHINASTERIDAE

Echinaster callosus Marenzelleri (Andaman Island)

E. purpureus (Gray) (Nicobar depth 5 m)

Cribrella mutans Koehler (Andaman Island)

Family : VALVASTERIDAE

Valvaster striatus Perrier (Andaman Island)

Family : PTERASTERIDAE

Euretaster cribrosus (V. Martens), depth 10 m

Order : FORCIPULATA

Family : ASTERIIDAE

Asterias mozophores Alcock and Wood Mason (Andaman Island, depth 457 m)

Family : BRISINGIDAE

Brisinga andamanica Alcock and Wood-Mason (Andaman Island)

Family : ZOROASTERIDAE

Zoroaster carinatus Alcock (Andaman Island, depth 237-437 m)

Z. gilesii Alcock (Andaman Island, depth 915 m)

Class : OPHIUROIDEA

Order : EURYALE

Family : GORGONOCEPHALIDAE

Gorgonocephalus cornutus Koehler (Andaman Island, depth 74-493 m)

Family : ASTEROSCEMATIDAE

Ophiocreas sp. (Andaman Island, depth 3008 m)

Order : OPHIURAE

Family : AMPHIURIDAE

Ophiocentrus verticellatus (Döderlein) (Port Blair, depth 40 m)

Amphipholis squamata (Delle Chiaje) (Port Blair, intertidal)

Ophiocnida picteti de Loriol (Andaman Island, depth 12 18 m)

Amphiura dispar Koehler (Andaman Island, depth 253-1215 m)

Amphiura misera Koehler (Andaman Island, depth 468m)

Amphioplus andrea (Lütken) (Andaman Island, depth 20 m)

A. intermedius (Koehler) (Port Blair intertidal)

Family : OPHIACTIDAE

Ophiactis savignyi (Müller and Troschel) (Port Blair, intertidal)

O. modesta Brock (Port Blair intertidal)

Family : OPHIOTRICHIDAE

Ophiothrix lepidus de Loriol (Andaman Island, depth 27-91 m)

O. stelligera Lyman (Andaman Island, depth 64 m)

O. trilineata Lutken (Andaman Island)

O. vitrea Döderlein (Andaman Island, depth 64-67 m)

O. propinqua Lyman (Andaman Island, depth 0-31 m)

O. aristulata Lyman (Andaman Island)

O. deligens Koehler (Andaman Island, 75 m)

M. speciosa (Koehler) (Port Blair, Nicobar Island)

M. longipeda (Müller and Troschel) (Andaman Island)

Ophiopteron elegans Ludwig (Andaman Island)

Family : OPHIOCOMIDAE

Ophiocomella sexradia (Duncan) (Port Blair, intertidal)

Ophiarthrum elegans Peters (Port Blair, intertidal)

O. pictum (Müller and Troschel) (Nicobar Island, Port Blair, intertidal)

Ophiocoma erinaceus Müller and Troschel (Port Blair, intertidal)

O. brevipes Peters (Port Blair, intertidal)

O. scolopendrina (Lamarck) (Port Blair, intertidal)

O. dentata Müller and Troschel (Port Blair, intertidal)

O. pica Müller and Troschel (Nicobar depth 5 m)

Ophiomastix annulosa (Lamarck) (Port Blair, intertidal)

Ophiopsila pantherina Koehler (Andaman Island, depth 6-67 m)

Family : OPHIOCHITONIDAE

Ophionereis porrecta Lyman (Port Blair, intertidal)

Ophiochiton modestus Koehler (Andaman Island, depth 484 m)

Family : OPHIODERMATIDE

Ophiorachnella gorgonia (Müller and Troschel) (Port Blair, intertidal)

O. infernalis (Müller and Troschel) (Port Blair, intertidal)

Ophiarachna incrassata (Lamarck) (Andaman Island)

Ophioconis indica Koehler (Andaman Island, depth 82m)

Ophiopeza custus Koehler (Andaman Island)

Family : OPHIOLEPIDIDAE

Ophiolepis cincta Müller and Troschel (Port Blair, intertidal)

O. superba H.L. Clark (Port Blair intertidal)

Ophiomusium elegans Koehler (Andaman Island)

O. scalare Lyman (Port Blair, depth, 204 m)

Ophiura kinbergi Ljungman (Port Blair, depth 20 m)

Ophioteichus nodosa (Duncan) (Port Blair, intertidal)

Amphiophiura ornata (Lyman) (Nicobar, depth 752 m)

Ophioceramis tenera Koehler (Andaman Island, depth 474-1163 m)

Ophioglypha aequalis Lyman (Andaman Island, depth 940-2196 m)

O. flagellata Lyman (Andaman Island, depth 741-1235 m)

O. forbesi Duncan (Andaman Island, depth 27 m)

O. sinensis Lyman (Andaman Island, depth 18-65 m)

O. sordida Koehler (Andaman Island, depth 36-64 m)

Ophiolyphus granulatus Koehler (Port Blair, depth 204 m)

Ophiomusa relicta (Koehler) (Nicobar, depth 1417 m)

Ophioplocus imbricatus (Müller and Troschel) (Port Blair, intertidal)

Ophiozona bispinosa Koehler (Port Blair, depth 204 m)

Family : OPHIACANTHIDAE

Ophiocamax fasciculata Lyman (Andaman Island)

Ophiocantha composita Koehler (Nicobar Island, depth 2909 m)

O. decora Koehler (Andaman Island, depth 36-65 m)

O. gratiosa Koehler (Andaman Island, depth 353-812 m)

O. pentagona Koehler (Andaman Island, depth, 219-525 m)

O. sociadilis Koehler (Andaman Island, depth 3299-3367 m)

O. vestita Koehler (Andaman Island, depth 356 m)

Ophiometra integra Koehler (Andaman Island)

O. rudis Koehler (Andaman Islands, depth 1290 m)

Family : OPHIOLEUCIDIDAE

Ophiernus adspersum Lyman (Andaman Islands, depth 766-3654 m)

Ophiopyren bispinosus Koehler (Andaman Islands, depth 470 m)

Family : OPHIOMYXIDAE

Ophiomyxa bengalensis Koehler (Andaman Islands, depth 316-457 m)

O. brevispina var. *irregularis* Koehler (Andaman Island, depth 51-65 m)

O. australis Lutken (Middle Andaman, intertidal)

Class : ECHINOIDEA

Sub-class : REGULARIA

Order : CAMARODONTA

Family : TEMNOPLEURIDAE

Temnopleurus toreumaticus (Klein) (Andaman Island, intertidal)

T. apodus Agassiz & H.L. Clark (Port Blair, depth 204 m)

Paratrema doderleini (von Martens) (Andaman Island)

Temnotrema scillae (Mazetti) (Port Blair, depth 27-448 m)

Trigonocidaris versicolor Koehler (Andaman Sea, depth 164-183 m)

Family : TOXOPNEUSTIDAE

Tripneustes gratilla (Linnaeus) (Port Blair, intertidal)

Toxopneustes pileolus Lamarck (Andaman Island)

Family : ECHINOMETRIDAE

Echinostrephus molaris (Blainville) (Port Blair, intertidal)

Echinometra mathaei (Blainville) (Port Blair, intertidal)

Colobocentrotus atratus (Linnaeus) (Andaman Island)

Order : AULODONTA

Family : DIADEMATIDAE

Astropyga radiata (Leske) (Andaman Island)

Diadema setosum (Leske) (Port Blair, intertidal)

D. savignyi Michelin (Port Blair, intertidal)

Echinothrix calamaris (Pallas) (Port Blair, intertidal)

E. diadema (Linnaeus) (Port Blair, intertidal)

Centrostephanus nitidus Koehler (Andaman Sea)

Family : ASPIDODIADEMATIDAE

Aspidodiadema nicobaricum Döderlein (South West of Nicobar)

Order : STIRODONTA

Family : STOMOPNEUSTIDAE

Stomopneustes variolaris (Lamarck) (Port Blair, intertidal)

Family : ARBACIIDAE

Pygmaeocidaris prionigera (Agassiz) (Andaman Sea, 1026 m)

Order : CIDAROIDA

Family : CIDARIDAE

Dorocidaris lorioli Koehler (Andaman Island)

D. tiara Anderson (Andaman Sea, depth 259-732 m)

Eucidaris metularia (Lamarck) (Andaman Island, depth 29-75 m)

Phyllacanthus verticillatus (Lamarck) (Andaman Island)

Procidaris purpureata Wyville-Thompson (Nicobar)

Prionocidaris brevicollis (de Meijere) (Andaman Sea, depth 82-457 m)

P. baculosa (Lamarck) (Port Blair, depth 5 m)

Sterocidaris alcocki (Anderson) (Andaman Sea, depth 237-1163 m)

S. indica Doderlein (Andaman Sea, depth 733-873 m)

Stylocidaris bracteata var. *albidans* H.L. Clark (Port Blair, 109-137 m)

Order : LEPIDOCENTROIDA

Family : ECHINOTHURIIDAE

Hygrosoma luculentum (Agassiz) (Port Blair)

Phormosoma bursarium A. Agassiz (Andaman Sea, depth 1163-1958 m)

P. verticillatum Mortensen (Andaman Sea, depth 1184-1958 m)

Sub-class : IRREGULARIA

Order : CLYPEASTROIDA

Family : CLYPEASTRIDAE

Clypeaster reticulatus (Linnaeus) (Andaman Island, depth 18-494 m)

Family : LAGANIDAE

Laganum laganum (Leske) (Andaman Island)

Family : SCUTELLIDAE

Echinodiscus auritus Leske (Andaman Island)

Family : ARACHNOIDEA

Arachnoides placenta (Linnaeus) (Port Blair, intertidal)

Family : FIBULARIIDAE

Echinocyamus crispus Mazetti (Andaman Island, depth 27-111 m)

Order : SPATANGOIDA

Family : BRISSIDAE

Metalia spatangus (Linnaeus) (West coast of Andaman Island)

M. sternalis (Lamarck) (Andaman Island)

Brissopsis luzonica Gray (Andaman Island, depth 36-148 m)

Family : PERICOSMIDAE

Pericosmus macronesius Koehler (Long Island, depth 100 m)

Family : SCHIZASTERIDAE

Brisaster indicus Koehler (Andaman Island)

Faorina chinensis Gray (Andaman Island, depth 84-183 m)

Moira stygia (Agassiz) (Andaman Island)

Prymnaster investigatoris Koehler (Port Blair)

Family : SPATANGIDAE

Breynia vredenburgi Anderson (Port Blair)

Maretia planulata (Lamarck) (Great Cocos Island, depth, 36-54 m)

Class : *HOLOTHURIOIDEA*

Order : DENDROCHIROTA

Family : CUCUMARIIDAE

Cucumaria alcocki Koehler (Andaman Island)

C. bacilliformis Koehler (Andaman Island, depth 14-36 m)

Havelockia herdmani Pearson (Andaman Island)

Thyone dura Koehler and Vaney (Andaman Sea, depth 80 m)

Family : PHYLLOPHORIDAE

Afrocucumis africana (Semper) (Port Blair, intertidal)

Pseudocucumis acicula (Semper) (Andaman Island)

Phyrella fragilis (Ohshima) (Port Blair, intertidal)

Order : ASPIDOCHIROTA

Family : STICHOPODIDAE

Stichopus chloronotus Brandt (Port Blair, intertidal)

S. variegatus Semper (Port Blair, intertidal)

S. herrmanni Semper (Port Blair, intertidal)

Family : HOLOTHURIIDAE

Labidodemas rugosum (Ludwig) (Port Blair, intertidal)

Holothuria moebii (Ludwig) (Andaman Island)

H. fuscocinerea Jaeger (Port Blair, intertidal)

H. edulis Lesson (Andaman Island)

H. impatiens (Forskal) (Port Blair, intertidal)

H. arenicola Semper (Port Blair, intertidal)
H. albiventer Semper (Port Blair, intertidal)
H. pardalis Selenka (Port Blair, intertidal)
H. scabra Jaeger (Port Blair, intertidal)
H. atra (Jaeger) (Port Blair, intertidal)
H. pervicax (Selenka) (Port Blair, intertidal)
H. hilla Lesson (Port Blair, intertidal)
H. leucospilota (Brandt) (Port Blair, intertidal)
H. erinaceus (Semper) (Port Blair, intertidal)
H. exilis Koehler and Vaney (Andaman Island, depth 65 m)
H. pyxis Selenka (South Andaman, intertidal)
H. prompta Koehler and Vaney (Andaman Island)
H. rigida (Selenka) (Port Blair, intertidal)
H. remollescens Lampert (Grand Coco Island)
Actinopyga mauritiana (Quoy and Gaimard) (Port Blair, intertidal)
A. echinites (Jaeger) (Port Blair, intertidal)
A. miliaris (Quoy and Gaimard) (Port Blair)
A. lacanora (Jaeger) (Andaman Island)
Microthele nobilis (Selenka) (Port Blair, intertidal)
Bohadschia marmorata (Jaeger) (Port Blair, intertidal)
B. argus Jaeger (Port Blair, intertidal)
B. vitiensis (Semper) (Port Blair, intertidal)

Family : SYNALLACTIDAE

Pelopatides gelatinosus (Walsh) (Andaman Island, depth 344-896 m)
P. mollis Koehler and Vaney (Andaman Island, depth 896 m)
P. ovalis (Walsh) (Andaman Island, depth 896 m)
Synallactes wood-masoni (Walsh) (Andaman Island)

Order : MOLPADONIA

Family : CAUDINIDAE

Acaudina molpadoides (Semper) (Andaman and Nicobar Islands)

Order : APODA

Family : CHIRIDOTIDAE

Polycheira rufescens (Brandt) (Port Blair, intertidal)

Family : SYNAPTIDAE

Protankyra errata Koehler and Vaney (Andaman Island)
P. innominata Ludwig (Andaman Island)
P. timida Koehler and Vaney (Andaman Island, depth 1024-1026 m)
Synapta maculata (Chamisso and Eysenhardt) (Port Blair, intertidal)
Patinapta ooplax (Marenzeller) (Port Blair, intertidal)
Ophiodesma grisea (Semper) (Port Blair, intertidal)

Family : MYRIOTROCHIDAE

Ankyroderma danielssenii Theel (Andaman Sea, depth 484 m)
A. musculus (Risso) (Andaman Island depth 484-1733 m)
Trochostoma andamanense Walsh (Andaman Sea).